Building Bridges:
Boundary Spanners in Servitized Supply Chains

Abstract

Purpose: Solutions provision depends on effective and efficient supply chains. Existing discourse within servitization has remained at the organisational or inter-organisational level with a limited emphasis on the role of individuals. However, supply chains are not just relationships between organisations; they are complex, inter-personal relationships that span organisational boundaries. The limited focus on boundary spanners and their interactions means that managerial roles critical for the provision of solutions remain unidentified. The aim of this research is to identify the functions, roles and practices of boundary spanners that connect organisations and enable the effective provision of solutions.

Design/methodology/approach: A case study comprising 61 interviews in 11 firms was conducted in the UK network of a commercial vehicles manufacturer, to investigate boundary spanning for product and solutions provision.

Findings: The functions of boundary spanners in solutions provision move from communicating product and price features in product provision towards *strategic communication, dissonance reduction, professional education, consultation* and *leveraging offerings*. The study also identifies the boundary spanning roles and practices that form these functions for solutions provision.

Originality/value: This is the first study in servitization that identifies and describes the boundary spanning functions, roles and practices. By adopting the lens of boundary spanning, the research addresses the lack of empirical managerial-level enquiry within servitization research. It extends the theoretical discussion on the differences between supply chain management in servitized versus product contexts.

Keywords: servitization, boundary spanners, buyer-supplier relationships, case study

Paper Type: Research paper

1. Introduction

Under a strategy of servitization, a firm integrates or sells a solution (Storbacka, 2011; Tuli *et al.*, 2007) or a system of products and services (Neely, 2008). Servitization is a service-based business model that requires working closely with multiple suppliers, partners and customers (Bastl *et al.*, 2012; Jaakkola and Hakanen, 2013). Thus, supply chains and inter-organisational exchange become more complex (Chakkol *et al.*, 2014; Kreye *et al.*, 2015), and the management of relationships with suppliers and customers becomes critical for solution providers (Johnson and Mena, 2008).

Past research has investigated the structure and configuration of supply chains to deliver solutions (e.g., Baines and Lightfoot, 2013; Johnson and Mena, 2008) and considered inter-organisational relationship management in servitized environments (e.g. Bastl *et al.*, 2012; Kreye *et al.*, 2015). This literature is replete with calls that say servitization requires closely coupled relationships that are underpinned by cooperative norms, tighter operational linkages and high levels of communication (Bastl et al., 2012; Chakkol *et al.*, 2014; Kreye *et al.*, 2015; Raddats *et al.*, 2017). So far, the focus has been almost exclusively limited to the organisational or inter-organisational level of analysis, with little emphasis on the roles of individuals.

Inter-organisational relationships are built and sustained by individuals who span inter-organisational boundaries (Ring and Van de Ven, 1994). These individuals are known as boundary spanners (Aldrich and Herker, 1977) and their interactions can be viewed through their functions, roles and practices (see: Zhang et al., 2011). Boundary spanners facilitate effective inter-firm collaboration (Richter et al., 2006), contribute to value creation and knowledge sharing (Kostova and Roth, 2003), and the development of social capital (Nahapiet and Ghoshal, 1998). When services are being delivered, boundary spanners significantly influence exchange performance, and the customer's perception of service quality and value (Paulin et al., 2000; Prior, 2016).

In a servitization context, boundary spanners play a key role in effective provision of solutions (Storbacka, 2011), through the adoption of distinctive service styles (Prior, 2016). It has been observed that their removal can lead to disruptions to inter-organisational relationships (Roehrich and Lewis, 2014). Moreover, boundary spanners play a role in improving an organisation's capabilities (Kreye et al., 2015) and contribute to knowledge development and solution design (Raddats et al., 2017). However, the functions, roles and practices of boundary spanners who connect

organisations and enable the effective provision of solutions are loosely discussed in the extant servitization literature. Moreover, they have yet to be compared to a pure product-based exchange; doing so would help identify the additional managerial capabilities when a manufacturer adopts a servitization strategy. To address this, we examine the boundary spanning functions, roles and practices of managers who connect organisations and enable the effective provision of solutions. As such, the following research questions will be addressed:

RQ1: What are the boundary spanning functions, roles and practices that facilitate inter-organisational relationships in solution provision?
RQ2: How do these boundary spanning activities differ from product provision?

This research adds to the discourse on the differences between supply chain management in pure manufacturing and servitized environments. The main contribution lies in the identification and discussion of the hierarchy of boundary spanning functions, roles and practices that foster the mobilisation of network resources that, in turn, contribute to the provision and support of solutions by the network as a whole.

The remainder of the paper is structured as follows: A review of the relevant literature on servitization and boundary spanners is presented in section 2. Section 3 details the methodology. Section 4 provides a detailed description of the empirical case context within which the boundary spanners interact. This is followed by the findings in section 5, where the synthesis of emergent boundary spanning functions, roles and practices are explained. In section 6, the key findings are discussed in relation to the prior literature, leading to conclusions with theoretical contributions and managerial implications.

2. Literature Review

2.1. Servitization and Inter-organisational Relationships

Effective and efficient solutions provision hinges on the performance of the servitized manufacturer's supply chain (e.g. Johnson and Mena 2008; Windahl and Lakemond 2006). Previous research has examined how the manufacturer reconfigures its supply chain and manages relationships with first-tier customers and suppliers (Bastl et al.,

2012; Peng et al., 2010; Windahl and Lakemond, 2006). Closely integrated and collaborative relationships between suppliers, intermediaries and customers, based on increased information exchange and cooperative norms, are beneficial and contribute to successful solutions provision (Baines and Lightfoot, 2013; Bastl et al., 2012; Jaakkola and Hakanen, 2013; Peng et al., 2010; Raja *et al.*, 2013). Solution providers need to develop a relational approach with an emphasis on long-term partnerships underpinned by trust and personal relationships in order to satisfy customers' evolving needs (Raja *et al.*, 2013). Hence, to effectively manage the increasingly complex contracts and the closer relationships with suppliers and customers, the development of relational capabilities is a necessary supplement to contractual capabilities (Hartmann *et al.*, 2014; Kreye *et al.*, 2015).

The lack of empirical work on boundary spanners in servitization is a critical shortcoming, since boundary spanners are crucial in service contexts that require high operations visibility and frequent contact with customers (Paulin *et al.*, 2000; Prior, 2016; Zhang et al., 2011). Indeed, it is boundary spanners who, through frequent service visits and informal information exchange, develop the servitized organisation's relational capabilities to manage offerings involving complex services (Kreye et al., 2015; Raddats et al., 2017). However, to date, there is limited insight as to '*who does what and why*' in servitized networks, hence the roles of individual boundary spanners remain unidentified. Next, the relevant literature on boundary spanners is reviewed and synthesised.

2.2. Boundary spanners

Boundary spanners (or boundary spanning employees) are individuals who have roles at the interface of an organisation and its external environment (Aldrich and Herker, 1977; Richter *et al.*, 2006; Stock, 2006). The term originates from boundary theory, which argues that *'[…] a central task of organisations is to manage their boundaries with other organisations that supply critical resource inputs'* (Zhang *et al.*, 2011, p. 319). Research on boundary spanners focuses on their functions, roles and/or practices (Zhang *et al.*, 2011). These are closely linked: functions are formed of roles, and roles are enacted through collections of boundary spanning practices. Thus, at the highest level are the boundary spanning functions that constitute the key mechanisms to develop, facilitate and sustain inter-organisational relationships. These functions can be seen as

the contribution of boundary spanners to the effective working of inter-organisational relationships. For example, a common function of boundary spanners is to achieve effective communication between firms involved in an exchange relationship. At the middle level are the specific boundary spanning roles, such as communicator, leader or innovator, each of which encompasses a number of practices. These boundary spanning practices, at the operational level, are the everyday, observed manifestations of the boundary spanners' roles within the network. As such, the boundary spanning practices include negotiating with clients, or contracting with external suppliers.

Next, boundary spanning functions, roles and practices are elaborated upon, and their relevance to servitization is discussed.

Functions

Functions can also be called capabilities, such as in Zhang et al. (2011). In this research, the original term 'functions' is used, which is in line with boundary theory (Aldrich and Herker, 1977). Aldrich and Herker (1977) originally proposed two key boundary spanning functions: 1) information processing and 2) external representation. The former refers to the ability of boundary spanners to acquire, interpret and transfer external information into the organisation, while the latter is a firm's response to its external environment. External representation functions are the most relevant to managing relationships in a network (Perrone *et al.*, 2003). As such, Zhang *et al.* (2011) proposed three main external representation functions: 1) strategic communication, i.e., the ability to communicate information from the core of an organisation towards the environment; 2) professional knowledge, i.e., using knowledge and expertise to influence the external environment; and 3) the ability to compromise, i.e., the effectiveness to overcome challenges and disputes between the firm and its suppliers. Furthermore, Kragh and Andersen (2009) identified the importance of boundary spanners' ability to facilitate and align the interests of different firms in a network by shaping the middle ground, arguing that this goes beyond the simple facilitation of communication and exchange. This resembled the ability to reduce the cognitive dissonance between different firms – referred to by Bacharach *et al.* (1996) as dissonance reduction.

Although boundary spanning practices and roles pertinent to servitization have been peripherally discussed (see: Roehrich and Lewis 2014; Storbacka, 2011), the functions have neither been identified nor discussed in prior research. In contexts such as

servitization that entail multi-level, frequent interactions between individuals from different parties (Chakkol *et al.*, 2014), it is expected that the boundary spanning functions would be critical. Hence, strategic communication, professional knowledge, and the ability to compromise are expected to be manifest in servitization contexts.

Roles and Practices

There are a number of different roles that can be adopted by boundary spanners in inter-organisational relationships. For instance, a boundary spanner could be a communicator, leader, entrepreneur, innovator or a combination thereof (Williams, 2002). These roles are the assigned or assumed parts played by a boundary spanner in a particular exchange relationship and are underpinned by associated practices. According to extant research, boundary spanning practices include a range of exchange activities, such as negotiating, liaising with customers, processing information, maintaining the image of the organisation, contracting and collaborating with external parties (Aldrich and Herker, 1977; Cross *et al.*, 2000; Stock, 2006; Zhang *et al.*, 2011). The term 'practice' denotes an activity or a combination of activities that facilitate communication and exchange among different firms.

Bensaou (1999) identified that for arms-length market relationships, boundary spanning involved limited time spent with partners, with rare visits and highly routine and structured practices governed by formal contractual mechanisms. These types of relationships mainly resemble product-only offerings that are short-term and transactional in nature. Conversely, solutions provision usually takes place over a longer period, implying close inter-firm relationships of a strategic nature (Baines and Lightfoot, 2013; Bastl *et al.*, 2012). Within strategic relationships, boundary spanners are more likely to have closer relationships with external partners when the level of idiosyncratic investments and customisation is high (Bensaou, 1999; Lian and Laing, 2007). As such, their activities may entail large amounts of time spent with partners, with frequent visits focused on coordination rather than control (Bensaou, 1999). These practices may be new to the manager (Baines *et al.*, 2013). Thus, in servitization, the role of boundary spanners can evolve from one that merely creates communication linkages to one that facilitates value creation (Nanonen and Storbacka, 2013). In light of the reviewed literature, the research framework is presented in the next section.

2.3. Research Framework

Having synthesised the relevant literature, it is suggested that boundary spanning would be more developed and pronounced in solutions provision than in pure product provision, due to extensive interpersonal interaction across the network (Prior, 2016). However, that is not to say that close and multi-level interpersonal relationships within manufacturing networks are absent (see Ulaga and Eggert, 2006). But, due to complex services requiring closer relationships and more developed organisational relational capabilities (*cf.* Kreye et al., 2015), it can be argued that boundary spanning functions, roles and practices would be more prevalent, and possibly formalised, when the network provides and supports solutions. Strategic communication, professional knowledge and the ability to compromise are expected to underpin the provision of solutions as boundary spanning functions. Solutions involve services, which are delivered over the long-term, hence creating an operational environment that involves routine and relational boundary spanning practices. To support these services, training and coordination at different levels within the network is required in order to meet the evolving needs of the customers (Baines *et al.*, 2013; Raja *et al.*, 2013; Roerich and Lewis, 2014). As such, boundary spanners are likely to assume roles in communication, negotiation or training in order to support the effective provision of solutions. Based on this argumentation, and on the reviewed literature, a conceptual framework is developed to act as a starting point for empirical enquiry (Table 1). It juxtaposes the boundary spanning functions, roles and practices in the product and servitized contexts. The framework's purpose is not to be deductively tested, but rather, in an abductive fashion (Dubois and Gadde, 2002), it is used as an initial guide, to be refined and extended through data collection and analysis.

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Table 1. Conceptual framework derived from prior literature

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3. Research Design

Since little is known about boundary spanning in servitization, rich, detailed and evocative data are needed to shed light on the phenomenon (Miles et al., 2014; Voss et al., 2002). Given the nascent state of the related literature, a qualitative case study is suited to the research questions (Edmondson and McManus, 2007) as it enables the phenomenon to be observed in its natural context and can answer "what" and "how" questions (Voss et al., 2002). A conscious decision was made to focus on a single network, in order to generate deep and rich descriptions (Yin, 2009), capturing the complex, interconnected and messy nature of boundary spanning.

To conduct the network case study, an abductive approach was adopted (Dubois and Gadde, 2002). This approach treats theory and practice simultaneously and in an iterative manner (Dubois and Gadde, 2002; Ketokivi and Choi, 2014). As such, prior research informed the theoretical foundations of this study. These have been synthesised in a conceptual framework (Table 1) and used as a guide for data collection and analysis. As the analysis unfolded, the research framework was extended, refined and empirically substantiated to form the findings. Next, the data collection and analysis processes are detailed.

3.1. Case selection and background

The data were collected over a 3-year period (2009–2012), from customers, suppliers (i.e., dealers) and the technology partner of a UK-based commercial vehicles manufacturer, referred to as AlphaCo. It is the UK subsidiary of a large European commercial vehicles manufacturer. AlphaCo is a leading commercial vehicle manufacturer, which has a turnover in excess of £700 million and employs approximately 1,000 employees. AlphaCo vehicles are sold centrally through sales representatives who are based throughout the dealer network. The product range includes heavy trucks, medium trucks, buses, coaches and specialist trucks. At the time, AlphaCo's servitization 'journey' was considered a success within practitioner circles, since approximately 60% of its revenue came from services. Servitization had contributed to, on average, a fivefold increase in AlphaCo's market share since 1992, across all commercial vehicles categories. In addition, secondary data on the service performance of AlphaCo's dealers showed a twofold increase in performance over the two years before data collection. Hence, AlphaCo comprises a case of successful

servitization. It is considered a special or unusual case, in the sense that it shows notable outcomes in terms of success (Yin, 2009). In addition, AlphaCo has contracted independent suppliers (i.e. dealers) to deliver the services, which creates an environment of increased boundary spanning during solutions provision. We present this empirical context in detail in Section 4 to describe the complex boundary spanning managerial relationships within the AlphaCo case. Later in Section 5 we present the synthesis of findings related to boundary spanning functions, roles and practices for solutions provision. Thus, the findings on boundary spanning functions, roles and practices within this case, may inform typical or less successful servitized networks.

3.2. Data Collection

Between 2009 and 2012, the researchers had over 200 interactions with the involved companies. These interactions (i.e., opportunities for data collection) consisted of interviews, company meetings, conferences, executive presentations, informal conversations, research updates, sales presentations, phone conversations and site observations. The duration of the interactions varied from a 2-day visit to AlphaCo's headquarters to short e-mail conversations with executives. The team also had access to documentation, including financial, training, dealer performance and telematics data. The main data source for this research were semi-structured interviews. It soon became evident that many boundary spanners operated across the network rather than within a single dyad, so to acquire a holistic understanding of how they facilitated the solutions provision, it was necessary to visit 10 of AlphaCo's customers, partners and dealers. In total, 61 semi-structured interviews were conducted, recorded and verbatim transcribed (Table 2). All companies were visited in person, and the interviews were usually preceded by a tour of the facilities.

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Table 2. Interviewee details

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Interviews started with the CEO and board-level executives of AlphaCo. These were exploratory in nature, focusing on the strategic issues related to the company's

servitization journey. This stage helped the researchers familiarise themselves with the context while the main themes critical to servitization were emerging. These individual themes constituted separate research directions, one of which was the changing nature of boundary spanning individuals. Thus, later interviews, which were led by the framework presented in the previous section, progressively focused on the functions, roles and practices of boundary spanners. The interviewees were identified through snowball sampling (Miles *et al.*, 2014). AlphaCo managers were asked to list their key counterparts within customer, dealer and partner organisations that have been long-time members of the AlphaCo network. The long-term relationships were required to increase the researchers' confidence that boundary spanning practices had matured. As such, the shortest firm-level relationship of those studied was 10 years. AlphaCo executives also identified other network-facing employees in their organisation who were subsequently interviewed.

A typical interview centred on the nature, content and frequency of the interaction and communication between the interviewee and other boundary spanners in the network (see Appendix 1 for a sample of the interview questions); the goal was to probe for the initially identified boundary spanning functions, roles and practices (Table 1). Interviewing managers from multiple organisations who interacted with each other at the inter-personal level helped the authors triangulate the data. In particular, respondent triangulation was used as there were always two or more people asked about each inter-personal relationship between boundary spanners. This was made possible through snowball sampling. The process was also supported by the review of secondary data, such as company documents, annual reports, marketing and sales material, as well as confidential policy documents.

The units of analysis for this study were the individual boundary spanners. These boundary spanners are embedded within the AlphaCo network of dealers, customers and partners. The AlphaCo network was conceptualised as having two modes: the mode for providing a standalone product as a baseline operation and the solutions provisions mode. This was used for comparing boundary spanning during product provision to boundary spanning during solutions provision. The questions were framed appropriately to differentiate between the two, and there was a focus on uncovering and codifying the observed day-to-day boundary spanning practices. The two modes are shown in Figure 1.

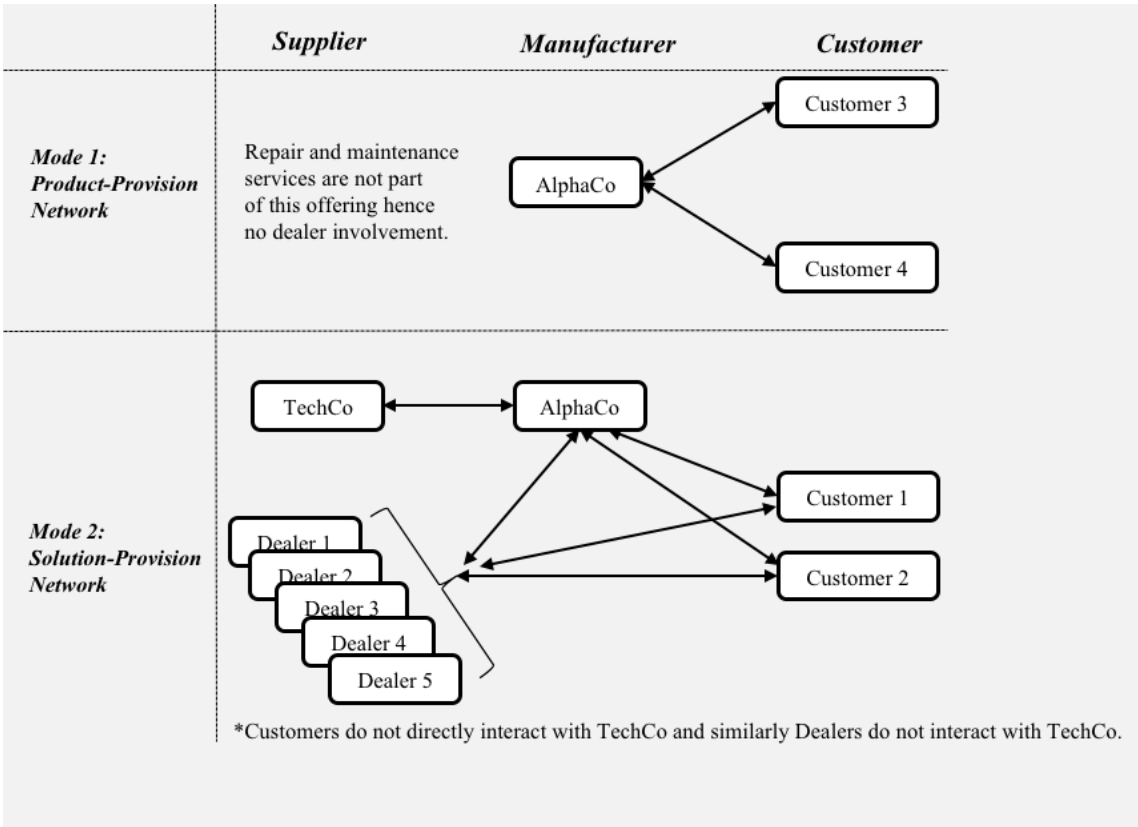

Figure 1. Illustrative network structures for product and solution provision

Product-provision network. This is comprised of the sale and delivery of a stand-alone vehicle, which was the baseline for the operations of AlphaCo and its network. The traditional product offering of AlphaCo comprises commercial vehicles sold with a warranty. Within the industry, AlphaCo is known for its advanced engineering capabilities and high quality products. During the time of this work, approximately 40% of AlphaCo's revenues came from product-only offerings. The customer base for product offerings consisted predominantly of owner-drivers and small fleet operators, with the remainder being fleet operators who have their own maintenance facilities.

Solution-provision network. The solution offerings of AlphaCo include vehicles integrated with maintenance and telematics services—delivered over a period based on fixed monthly (or quarterly) payments. The contract length is typically three to five years. Maintenance services include every type of truck repair, excluding accident-related damage and tyre replacement, and are provided by a network of AlphaCo-owned and independent dealers (Figure 1). The telematics technology, provided by AlphaCo's

technology partner ('TechCo' in Figure 1), allows for monitoring vehicle usage via telemetry installed in the vehicle. This records an extensive number of parameters, including fuel usage, braking, exhaust braking, idling, cruise control, acceleration, deceleration and some advanced features, such as cabin cameras. Telematics services could be tailored to the customer's needs, ranging from location and security features to customised driver-training programmes offered on the back of the technology. Solution offerings encompassing only maintenance services accounted for 50% of AlphaCo's total revenues, while contracts with maintenance plus telematics accounted for the remaining 10%. In terms of positioning these offerings within a servitization typology, the former can be seen as an example of product-oriented services whilst the latter is an instance of use-oriented services (*cf.* Tukker, 2004). Since the change of leadership within AlphaCo over a decade ago, AlphaCo has gradually increased its service portfolio, especially by utilising telematics technology. The drive towards services was an official company strategy and as a result, AlphaCo was considered the industry leader because it offered the most comprehensive list of additional services.

3.3. Data Analysis

A rigorous data analysis process was adopted; this process is mainly used in ethnographic research to examine large-scale qualitative data (Huxham and Vangen, 2000; Vangen and Huxham, 2003). This was predominantly shaped by four iterative stages that were aimed at: 1) understanding and making sense of the context, 2) identifying themes (i.e., boundary spanning roles and functions), 3) drawing out relationships and links and 4) developing meaningful representations (Vangen and Huxham, 2003). At the same time, and during each stage, the authors cycled between data and theory, linking the emerging insights to the initial conceptual framework (Table 1), progressively modifying and embellishing it. Subsequent data collection was informed by the revised framework.

Stage 1: Understanding and making sense of the context. Initial data collection helped the researchers understand the context within which the 11 companies interacted and conducted business. This enabled the pursuit of various streams of enquiry regarding boundary spanning, resulting in a corpus of transcripts, documentation, research notes and memos. Early on, a case description document was created and shared with key informants within the network to ensure an accurate understanding of

the research context and the key aspects of boundary spanning. This stage is in line with widely cited prescriptions in the operations management domain (*cf.* Barratt et al., 2011; Voss et al., 2002).

Stage 2: Identifying themes. The research was conducted in the abductive tradition (Kovács and Spens, 2005; Voss et al., 2016). *"In case research, abductive reasoning involves modifying the logic of the general theory in order to reconcile it with contextual idiosyncrasies"* (Ketokivi and Choi, 2014; p. 236). In this research, the conceptual framework (Table 1) comprised the general theory while the context of solutions provision was investigated for its idiosyncrasies in comparison to product provision. The initial conceptual framework, which had been derived from extant research examining the phenomenon of boundary spanners, was elaborated to fit the solutions context (cf. Ketokivi and Choi, 2014). As such, Table 1 served as an initial coding template. Two researchers independently reviewed the data to identify 'instances' of boundary spanning practices. This involved identifying and storing quotes, events, objects, interpretations and observations, referred to as data items (or codes). The data items (boundary spanning 'practices') were collectively collapsed into higher-order themes (boundary spanning 'roles' and 'functions'; King, 2004), and these were often labelled with a term from the participant's language. These roles and functions were combined in the original template structure defined by the initial conceptual framework, and when necessary, the framework was modified (or 'elaborated') to extend it and incorporate the new themes (see Stage 3). Data collection continued until no new insights emerged, and the template did not evolve after successive rounds of interviews. This ensured theoretical saturation (Glaser and Strauss, 1967). For expository purposes, Appendix A presents part of the final coding structure for the boundary spanning function that was termed *consultation*, which has not been clearly identified within prior research. Thus, this was not part of the initial template, forcing its modification and refinement and allowing for theory elaboration (Ketokivi and Choi, 2014).

Stage 3: Drawing out relationships and links. This process included all four researchers and was predominantly focused on drawing out the relationships between the identified roles and functions (Voss et al., 2002; 2016). Mind-mapping software facilitated this stage of the analysis. There were discussions and negotiations between the researchers on how the roles and functions related to the initial and subsequent

versions of the conceptual framework. For instance, in the initial rounds of coding, the 'representative' role was linked to a different boundary spanning function, namely, *external representation*. However, as a result of collective discussions, this role was included in the *strategic communication* function.

Stage 4: Developing meaningful representations. This was the final step of the analysis and involved *'[…] the drafting, redrafting and circulating for comment of the main body of the article, presenting the arguments at academic conferences and discussing them with practitioners'* (Vangen and Huxham, 2003, p. 65). This is in line with widely utilised recommendations for case research in operations management (*cf.* Barratt et al., 2011). This resulted in further clarifications to the relationships between boundary spanning functions, roles and practices. For example, it was agreed that the *ability to compromise* was not abstract enough as a term to denote the boundary spanning function in servitization; hence, the *dissonance reduction* function was reframed and finalised. The outcome was the refined, empirically informed, nuanced framework presented in the next section.

4. Overview of the empirical context

Within this section, an overview of the two networks for products and solutions provision is presented. For each network, the boundary spanning managerial relationships are described within their empirical context.

4.1. Product Provision

The traditional product offering of AlphaCo comprises commercial vehicles that are sold with a warranty but no additional services. Here, the key boundary spanning function within the product provision context was communication. For AlphaCo, this function was mainly conducted by sales executives. As part of this role, the key boundary spanning practice was to effectively communicate the features of products to customers and negotiate the prices pertaining to these features.

For owner-drivers and SME customers, communication only occurred at the sales level and usually involved sales executives. For larger fleet operators, AlphaCo used key account managers to negotiate with fleet engineers. Here, the interactions among the boundary spanners were mainly focused on the truck and its price:

"Customers [of product offering] *just want to buy a truck and not bother with repair and maintenance services […] Normally they do not see us until their next purchase"* (Regional Sales Director, AlphaCo)

"If we weren't selling them repair and maintenance, we wouldn't even need to know which depots they're going to. We would just say, 'There's your vehicle, run off and sort it.'" (Account manager, AlphaCo)

For product-only offerings, when customers required their trucks to be repaired or serviced, they usually contacted third-party service organisations, including AlphaCo dealers; but these were occasional and irregular transactions and were not contracted through AlphaCo.

Overall, the function of boundary spanners for product provision was limited to communication based on price and product features and to the associated negotiations on warranty details and financial options, underpinned by structured and routinized practices. A customer, for example, summarized the interactions as follows:

"When we are buying trucks, our negotiations are focused on product technology, price and add-ons." (Customer 3, Small Fleet Owner)

The interactions between boundary spanners in the product provision network are shown in Figure 2.

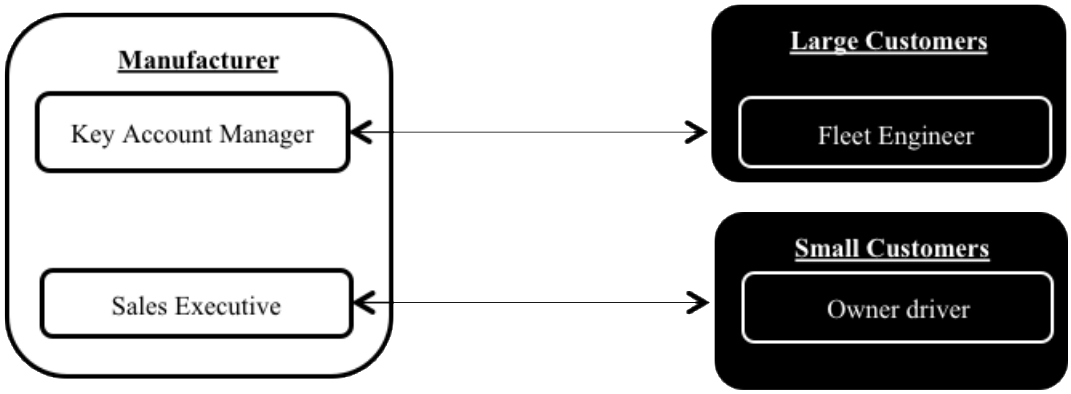

Figure 2. The main boundary spanners for product provision

4.2. Solutions Provision

Compared to the 'baseline' product offerings, boundary spanning in the solutions provision was much more complex. Next the context of each dyadic inter-firm

relationship is discussed to provide rich and clear descriptions of the emergent boundary spanning in solutions provision.

Manufacturer–Dealer Relationship

The most complex relationship within the network was between the manufacturer and the dealers. The majority of the dealers were independent companies holding an AlphaCo franchise agreement. As part of the solution offerings, maintenance services were provided by the dealers on behalf of the manufacturer. Here, relationship management was crucial because the contract was between AlphaCo and the customer, but over the course of the contract, it was the responsibility of the dealers to maintain the vehicles. After solutions were first introduced to the market, AlphaCo managers realised the need to oversee and monitor dealer performance because some dealers were unable to deliver the required service levels. This inability had resulted in customer complaints and reduced customer retention.

Because of the frequent repair and maintenance service activities, simply relying on faceless inter-organisational information systems was not enough for dealers. Regular communication between boundary spanners over the phone became necessary to overcome bottlenecks caused by IT systems or for clarification and assistance. Face-to-face communication was also considered essential for operations:

> *"I need a name and a face that I can see. If I rang [a manager] and said I'm really struggling, would you come down, he'd probably come down the next day. Or that same day."* Service Team Leader at Dealer 4.

Furthermore, there was a need for information to flow from dealers to AlphaCo (e.g., feedback related to customer needs) when selling or extending the service package.

Manufacturer–Customer Relationship

The nature of boundary spanning between manufacturer and customer was mainly influenced by the type of services provided. For repair and maintenance services, the relationship occurred at the middle-management level, where the main boundary spanners were key account, after-sales and parts managers at AlphaCo; fleet engineers from customers; and service operations directors from dealers. Here, the boundary

spanning activities were conducted by key account management teams and fleet engineers who acted as negotiators for product and service features during the contracting stage. This was followed by the interaction of dealer service managers and customer fleet engineers who acted as communicators of service-related operations and procedures over the course of the contract.

For telematics services, boundary spanning involved more senior levels of management, i.e., the CEOs of AlphaCo and its customers. Here, the content of boundary spanning moved away from problem-based interaction towards a focus on creating value through the innovative use of technology. These discussions were mainly centred on the telematics, in order to create innovative value-adding services and practices.

Dealer–Customer Relationships

The introduction of an official 6-week truck inspection regulation had been a driver for services in the commercial vehicles industry. As such, customer vehicles were frequently serviced at dealer sites. The service performance of the dealership network was crucial in the sale of the offering. This was because the network effectively managed the day-to-day relationship with the customer base. To sustain the provision of solutions, a greater level of coordination and sharing of information between boundary spanners from AlphaCo, dealers and customers was required.

Within this context, there were numerous voluntary practices conducted by various dealer managers to resolve customer issues with AlphaCo. For instance, occasionally, the dealers' after-sales managers would meet customers proactively to inquire about problems and possible resolutions. In other instances, the parts advisors communicated customer complaints to AlphaCo because these advisors could gather customer feedback through their daily customer interactions. Another practice adopted by dealers was joint customer visits, where the after-sales manager of a dealer would accompany an AlphaCo representative. In sum, dealer–customer interaction between boundary spanners was complex and more frequent for solutions than just during service exchange in support of products.

Manufacturer–Technology Partner Relationship

The relationship between AlphaCo and the supplier of the telematics software and hardware (TechCo) could be defined as a strategic partnership. The telematics services

were developed in conjunction with TechCo, and they had a resident engineer in the telematics centre of AlphaCo who acted as a boundary spanner who provided system and software support. AlphaCo was reliant on the software capabilities of TechCo to provide these services:

> *"We wouldn't pretend to be computer programmers. So, we had the knowledge about what we were trying to record, what the parameters were. We presented that as a specification to [TechCo] and they developed the system to our specification."* After-Sales Director at AlphaCo.

Over the years, the relationship between boundary spanners has grown into a partnership underpinned by trust and mutual understanding:

> *"I speak to my channel account manager [at TechCo], every single day, every working day that is. We even meet socially now, it's like ... We did deals together with customers. There's a lot of trust there. We sell trucks on the basis of their system."* Head of Telematics Technology at AlphaCo.

Here, TechCo's boundary spanning activities were only limited to AlphaCo. There was no form of interaction with the dealer network that was responsible for installing the hardware.

In addition, TechCo had no systematic interaction with customers. They were only responsible for back-office activities involving the development and customisation of the software. When asked about the future of the telematics services, AlphaCo executives were unequivocal that the strategic partnership with TechCo would continue and new boundary spanning roles within AlphaCo would be needed to help the customers understand and interpret the data:

> *"We can concentrate then on the bit that we think we're good at which is helping the customers to interpret the reports to keep their operation in business. So we become more, consultants, if you like. Going out to educate [the customers]."* Head of Telematics Technology at AlphaCo.

Figure 3 demonstrates the key boundary spanners and their interactions in the provision of solutions. Here, the different shades indicate co-located personnel in another network partner. For instance the technology partner employed the telematics engineers, but they were co-located at the manufacturer and responsible for collecting and analysing telematics data.

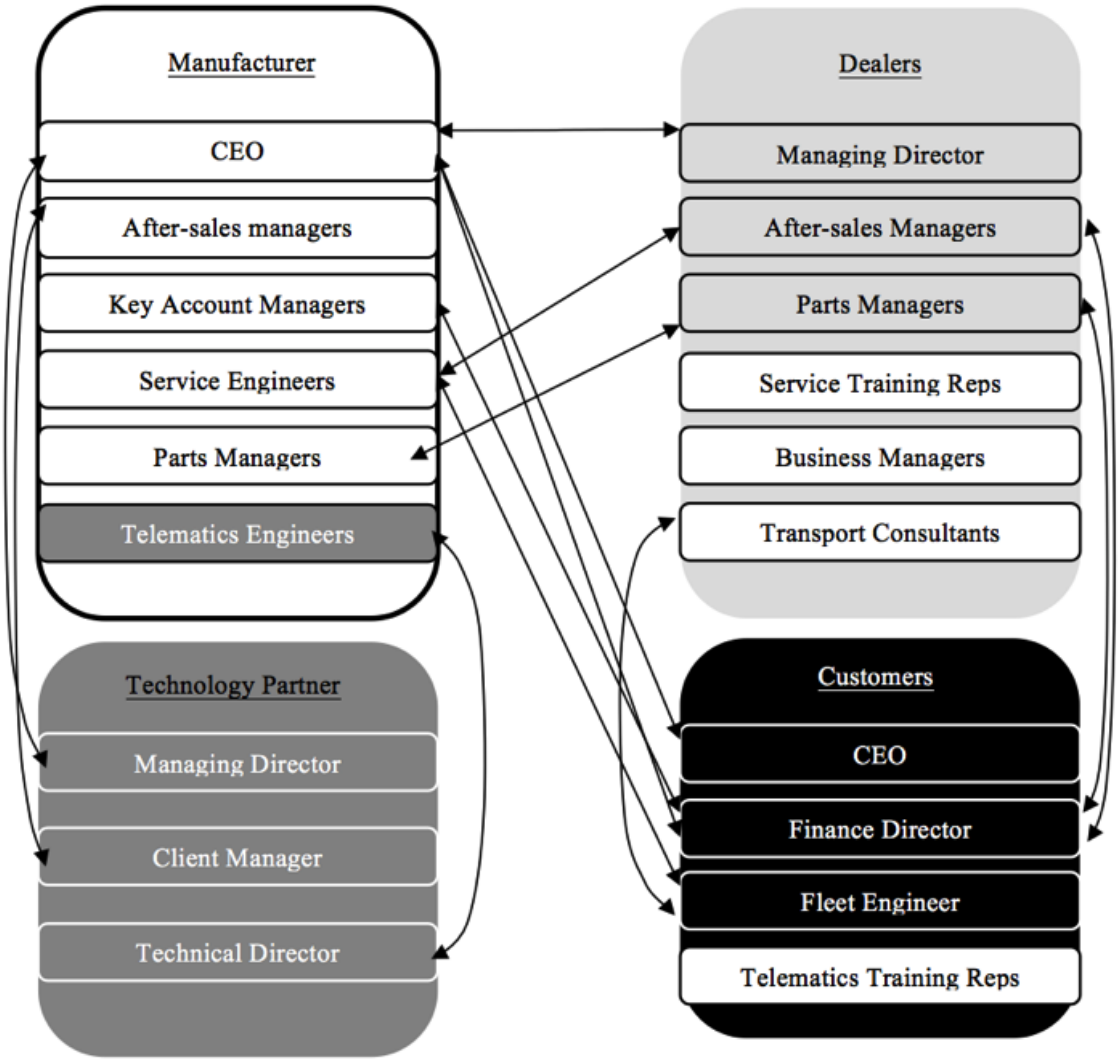

Figure 3. The key boundary spanners for solutions provision

5. Synthesis of Findings on Boundary Spanning in Solutions Provision

In this section, the synthesis of findings related to boundary spanning functions, roles and practices for solutions provision is explained in detail. The research identified five boundary spanning functions formed of six boundary spanning roles. The functions, roles and practices are discussed and combined in a framework (Table 3). This is an extended and refined version of the initial framework, substantiated with context-

specific empirical data. In addition, Tables 4 and 5 present the descriptions of boundary spanning functions and roles identified in solutions provision. The comparisons are presented to highlight the emergent contributions of this study in terms of theory elaboration. Overall, boundary spanning in solutions provision was considerably different from boundary spanning in product provision within AlphaCo's network. Next, each of the five boundary spanning functions and their associated roles and practices are discussed in detail.

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Table 3. Identified boundary spanning functions, roles, and practices in solutions provision compared to the initial conceptual framework

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Table 4. Definitions of identified boundary spanning functions in relation to conceptual framework (i.e. initial)

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Table 5. Definitions of identified boundary spanning roles in relation to conceptual framework (i.e. initial)

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5.1 The Strategic Communication Function

Strategic communication is defined as the ability to effectively present a firm's strategic intent and offerings. It pertains to all the actors within the network (i.e., manufacturer, dealer, technology partner and customer). The main roles encompassed by this function are 1) leader and 2) representative roles.

The Leader role for Strategic Communication and its associated practices

The leader role was considered of paramount importance for convincing all related stakeholders of the value of the solutions' offerings. This was especially important from the manufacturer's perspective. The highest level involvement of the manufacturer was required to drive the servitization agenda:

> *"[AlphaCo CEO] put this [i.e. servitization agenda] into place, so I would have said it's leadership, enthusiasm and belief in what he was doing that made the rest of us believe that as well. He convinced other people that this was the way forward."* Senior Board Level Executive at AlphaCo.

Leadership was central for changing the business mindset – one which emphasised the price and features of vehicles, to one that provides business solutions to customers. This meant that leading executives from customers, dealers and telematics partners needed to assume boundary spanning roles. The ***practices*** included dealer directors becoming involved in customer–manufacturer relationships, the CEO of the telematics partner creating joint platforms for integrating technology into AlphaCo solutions, and CEOs at customer organisations being involved in strategic negotiations and clearly communicating their business needs to the rest of the network.

The External representative role for Strategic Communication and its associated practices

The second boundary spanning role of the *strategic communication* function was external representation. This refers to the representation of the organisation in external environments to demonstrate the value of solutions to wider audiences. The representative role was enacted through various ***practices*** involving multiple organisations, such as the technology partner championing the use of telematics services as part of solutions. In other instances, it required the customers to champion the offering at exhibitions and conventions:

> *"If you went to the commercial vehicle show, look at the [AlphaCo] stand, just the signal that they sent out about their intent to the UK haulage industry. […]They had customers there to support them with case studies, so I was there.*

None of the others did, the others were selling the features of a truck […]. To me that was the first time I'd ever seen that kind of approach from a commercial vehicle operator." CEO at Customer 1.

5.2 The Dissonance Reduction Function

Dissonance reduction is the ability to reduce cognitive dissonance among actors. This was not systematic but simply conducted in an *ad hoc* manner, predominantly underpinned by trust and relational mechanisms. The main boundary spanning role that enacted this function was the relationship facilitator (see Table 3).

The Relationship facilitator role for Dissonance Reduction and its associated practices

This role was adopted by different individuals from the manufacturer, dealer or customer. In terms of managerial ***practices***, it included acting as the middleman in dealer-manufacturer-customer disputes or becoming a 'shock absorber' to reduce tensions by either offering incentives or covering associated costs. For instance, practices included joint problem solving, working on an informal basis and conflicts resolved through trust:

"We get on very well with the [AlphaCo national engineer] to the extent where we sometimes trade-off costs and recharges and when we've got a problem we work together on it. […] we know and respect each other for what we've done and when there is a conflict I think there's a lot of trust there." Managing Director at Dealer 2.

"If we have any problems, we have a [AlphaCo] engineer totally responsible for our contract. He is an excellent guy. He does anything, any time of day you want. That's the relationship that we are looking for and I don't think we'd get it with other manufacturers." Fleet Engineer at Customer 2

Furthermore, in an attempt to mediate the relationships between customers and AlphaCo, managers from dealer organisations usually intervened. For instance, they helped AlphaCo sales executives who were disgruntled with the poor support they received from the HQs familiarise themselves with the dealer's customers. Another

example of a relationship facilitator role was described as follows when dealing with a specific customer issue:

> *"In order to make it right for the customer, this is where the relationship comes in...we knew there was an issue, we gave* [AlphaCo] *every chance to deal directly with* [Customer 2]. *When* [AlphaCo] *had to say, we can't reach an agreement, we said* […] *we'll use our relationship with the customer to provide a solution. We were prepared to take the risk on these vehicles to support our customer and we did. My involvement was essential to deal with this customer issue."* (Business Development Manager, Dealer 2)

At the same time, when there were problems between dealers and customers at the firm level, the manufacturer's boundary spanners were asked to step in to mediate in the relationship to resolve the issue:

> *"If I have a problem with a customer, sometimes a customer will contact [AlphaCo manager] directly and say, oh, I took a vehicle into this dealer and they didn't do whatever, and what do you think. Then [AlphaCo manager] will ring me; ask me, I put across my point of view. He then becomes a mediator."* Service Team Leader at Dealer 4.

5.3 The Professional Education function

Professional education was crucial for boundary spanners, both in terms of individual development and also for educating internal and external stakeholders within the network. The function largely pertained to the manufacturer and technology partner and was delivered by boundary spanning trainer roles.

The Trainer role in Professional Education and its associated practices

The main boundary spanning roles enacting this function were the trainers responsible for disseminating professional knowledge and educating other parties, especially other boundary spanners.

AlphaCo had started to offer a wide range of training programmes since the introduction of solutions. These ***practices*** included personal development training for boundary spanners, such as courses on leadership, human resources, technical training

and management development. They also included the driver training package offered to customers as part of the solutions package. This training provided by AlphaCo, with technical support from TechCo, was a novelty within the industry:

> *"Some drivers, for example, go on driver training and they say, 'Ooh, I've been driving for 25 years. What can a young whippersnapper like you' to the driver trainer, 'possibly teach me about driving a truck?' Well, they go away from the course and their fuel economy goes up about half a gallon, in a truck one mile per gallon is a massive leap in economy. So, they shake the guy's hand and they say, 'I didn't know...'."* Head of Fleet Management at AlphaCo.

Educating both customers and dealers was a key part of boundary spanning for solutions provision. The training provided to the dealer network was concerned with both business and technical knowledge. To establish a consistent service delivery standard across the network, AlphaCo included employee skills and dealer training expenditure as some of their key performance indicators (KPIs). These measures were used to rate dealer performance. In addition to direct training programmes, AlphaCo also created platforms for sharing knowledge between dealers. An example of such a ***practice*** was the Convention attended by all dealer representatives, where they were encouraged to share promising practices and exchange knowledge with their counterparts. Further practices included professional development training for transport consultants, customised user training provided to the customers, and technical expertise training for dealer service managers.

5.4 The Consultation function

Consultation emerged as a central boundary spanning function during solutions provision. It is the ability to provide business and technical expertise to suppliers and customers; hence, it mainly concerns the manufacturer. Accordingly, AlphaCo had introduced key boundary spanning roles for this function, which were commonly referred to as business and technical advisors.

The Business and Technical Advisor role for Consultation and its associated practices

For dealer-facing relationships, AlphaCo introduced business advisors and regional engineers to aid the dealer network. The main responsibility of these consultants was to help underperforming dealers improve service delivery. Business advisors were responsible for helping dealers run the business more efficiently, whereas technical engineers were responsible for bringing the dealers' technological capabilities and expertise up to an acceptable standard. The main ***practice*** of these consultants was to proactively engage with poorly performing dealers:

> *"If you're struggling, they do have some business managers, or one business manager, which sort of looks at the commercial aspects of the business, not the technical side. So they will come in and help."* Services Manager at Dealer 5.

In terms of customer-facing relationships, one of the initial ***practices*** implemented was to own the channels to market by directly employing sales executives nationwide, thus restricting the sales of vehicles to AlphaCo's own sales force. The main reasons for this decision were, first, to create a consistent interface for customers across the UK and, second to be able to have an adequately trained sales force capable of selling solutions offerings to customers. These sales executives were then given offices within the respective dealer's premises in their sales regions. As a result, their job was turned into a truly boundary spanning role because they were directly employed by AlphaCo to interact with customers while based at dealers. Later, AlphaCo decided that selling solutions required deeper business and financial skills to be able to demonstrate the benefits to customers. Hence, they started sending their successful sales executives on training courses to turn them into 'transport consultants':

> *"We're moving away from selling lumps of metal and much more towards providing a solution. And we go to this huge extent to create über salesmen who can really get through to managing directors, as opposed to foot engineers, to sell the whole concept."* Head of Retail Business at AlphaCo.

The ability to provide business and technical expertise to suppliers and customers was identified as a key boundary spanning function. The function of *consultation* and its associated roles of business/technical advisors are unique to solutions compared to

product provision. For instance for Customer 1, AlphaCo provided operational consultation and advice even during the use of solutions offerings:

> *"With* [Customer 1] *we're ahead of the game with telematics service, which also is a big key part to controlling and advising* [the customer] *on how to control the fuel costs. That's the key to our service, it's the advising."* Sales Director at AlphaCo.

5.5 The Leverage Offerings function

The last emergent boundary spanning function was *leveraging offerings.* The function refers to introducing new services, practices and processes or extending existing ones to create value for the customer. The boundary spanning role that supports this function was the innovator.

The Innovator role for the Leverage Offerings function and its associated practices

The role was related to the manufacturer, customer and the technology partner. An example of an innovative service introduced in solutions was customised training programmes. The programmes were introduced through the initiative of boundary spanners from AlphaCo, customers and technology partners, and were designed specifically for individual drivers. The latter learnt how specific driving aspects, such as the use of the exhaust brake or cruise control, could be utilised to reduce fuel consumption. The customers of solutions offerings expected innovations that they could easily use to improve operations:

> *"I would expect more of them [i.e. truck manufacturers] sitting in their control centre producing lots of clever reports to tell me before I tell them, do you realise that driver there has gone backwards…. Because they've got access to everything we've got access to, because they were their vehicles, they know what's happening."* Fleet Engineer at Customer 2.

Thus, customers were interested in the long-term benefits they could reap through innovation, which was enabled by boundary spanners exploiting the telematics technology. In practice, the added value for customers was achieved through lower cost

per mile, customised training programmes and lowered CO_2 emissions. These were only achieved through the meaningful use of information aligned to customer needs. Within this, boundary spanners were influential in understanding customer needs and leveraging the offerings with the available information.

6. Discussion, Conclusions and Implications

6.1. Discussion of the Findings

Compared to the product provision network, the functions of boundary spanners in solutions provision moved from simply communicating product and price features towards *strategic communication, consultation, dissonance reduction, professional education* and *leveraging offerings*. To support these functions, boundary spanning roles changed from a dyadic orientation (e.g., basic interaction between the manufacturer's sales executives and the large customers' fleet engineers) towards a network orientation, with a view to improving the performance of the network as a whole. These roles (e.g., *trainer, innovator*) often involved teams rather than single individuals (e.g., transport consultants and telematics teams) and were less contractual and more relational, underpinned by trust, cooperation and a long-term orientation. These relationship qualities were prerequisites for roles to develop and establish themselves. Similarly, boundary spanning practices became complex in terms of the number and scope of activities involved.

Following the identification of five boundary spanning functions and their associated roles and practices for solutions, we now discuss these emergent findings in relation to the servitization literature.

Strategic communication has previously been identified in general management literature as a key boundary spanning function (Perrone *et al.*, 2003; Zhang *et al.*, 2011) and, within the studied solutions provision context, it also emerged as important. The results also identified its associated roles as leader and external representative. In the servitization literature, the need to have an internal champion or leader for servitization within the organisation has been discussed (Raddats *et al.*, 2017), but the relevance of a leadership role for boundary spanning from a network perspective has not been empirically demonstrated. The emergent findings clearly showed that the personal involvement of leaders was central to effective communication within the network.

Hence this finding points to the broader scope of leadership beyond the focal organisation for effective solutions provision.

Dissonance reduction emerged as a new function, which showed that boundary spanners adopted a relational approach to manage disputes, reduce tensions, and solve problems within the servitized network. The importance of a relational approach for effective solutions provision has been widely argued for servitization (Baines and Lightfoot, 2013; Peng *et al.*, 2010; Prior, 2016). Raja *et al.* (2013) showed that positive relational dynamics is a key attribute for manufacturers to achieve customer satisfaction in solutions provision. The findings support this notion and show how the firm-level relational approach is manifested amongst boundary spanners through dissonance reduction.

The identified boundary spanning function of *professional education* is an extension of what was originally named professional knowledge (Bensaou, 1999). The finding that a strategic move towards servitization by manufacturers necessitates specific training initiatives for employees has been pointed out in prior literature (Baines and Lightfoot, 2013). For instance, Johnstone *et al.* (2009) identified the benefits of corporate training programmes, focusing on service driven attitudes and behaviours for servitizing manufacturers. These training initiatives were largely discussed in terms of the professional development of technical and service skills for front/back office employees within the manufacturer. *Professional education* provided by boundary spanning trainers is key for educating external stakeholders within the network. This is achieved through disseminating professional knowledge and educating other parties, especially other boundary spanners.

Consultation emerged as a key boundary spanning function during solutions provision, and refers to the ability to provide business and technical expertise to network partners. This shows parallels with the findings of Tuli *et al.* (2007) at the inter-firm level, who discuss how the ability to provide information and guidance regarding their own operations and organisation is a customer-specific, inter-firm capability that contributes to the effectiveness of solutions provision. The related emergent findings of this research extend these insights to show that *consultation* is not only associated with customers at the dyadic level but is also manifested as a key function of boundary spanners across the network.

Leveraging offerings has emerged as a new boundary spanning function, which has not been previously identified in the servitization literature. Although it has been posited that boundary spanners in servitized contexts can be value creators (Nanonen and Storbacka, 2013), extant research has yet to adequately define or substantiate this with evidence. At the same time, it resonates with service development capabilities identified for the dyadic inter-firm relationships in Raddats *et al.* (2017), whereby manufacturer-customer interactions create new innovative offerings. The findings pertaining to this emergent boundary spanning function show that this does not only occur at a dyadic level but is manifested as a key function of boundary spanners across the network, involving multiple individuals from multiple firms, such as customers, suppliers, partners and manufacturers. Hence a network perspective provides a comprehensive illustration of how boundary spanning innovator roles can create advanced services through combining and matching partnering firms' resources for the benefit of the customers (such as the example of customised training programmes introduced in the AlphaCo case).

6.2. Conclusions and Contributions

This paper adopted boundary spanning as a lens to examine interaction in servitization at the *managerial level*. Focusing on boundary spanning functions, roles and practices allowed for the analysis of complex interactions between managers that enable the effective provision of solutions. Building on Bastl *et al.* (2012), Kreye *et al.* (2015) and Raddats *et al.* (2017), this work addresses the lack of empirical managerial-level enquiry within servitization research. Specifically, the contribution of this work comes from examining the differences in boundary spanning functions, roles and practices between product and solutions provision. To the authors' knowledge, this work is the first to undertake such a comparison focused on boundary spanners.

The results of the research demonstrate that in solutions provision, the existence of implicit and explicit boundary spanning functions, roles and practices is clearer and their influence considerably stronger. The findings comprise an extended, refined and empirically substantiated version of a primitive conceptual framework that synthesised the boundary spanners and servitization literature domains. The outcome of this research (Table 3) is comprised of theory elaboration that was reached after 1) identifying two additional functions (*consultation* and *leveraging offerings*); 2) refining

the terms of the existing functions and roles to more accurately describe the data; 3) providing empirical granularity to functions, roles and practices of boundary spanners in servitization; and 4) combining functions, roles and practices in a hierarchical manner.

The five boundary spanning functions, together with their respective roles and practices, serve as an extension to the servitization literature by providing granularity and clarity on the 'role of managers' within solutions provision. For instance, the hierarchy of identified functions, roles and practices vividly illustrates how the required (inter-) organisational relational capabilities (see Kreye *et al.*, 2015) translate into the individual (managerial) level, i.e., how these capabilities are 'performed' by the managers who connect organisations and facilitate solutions provision. Building on Storbacka (2011), Roehrich and Lewis (2014) and Prior (2016), the findings also contribute to the discourse on the importance of boundary spanners within servitization by observing and documenting the inter-organisational managerial functions, roles and practices, allowing products and services to be elevated so as to create value for all involved stakeholders.

Finally, this study extends Raddats *et al.*'s (2017) work by showing that many boundary spanners in servitization do not only operate within a single dyadic inter-firm relationship, but rather, they have links with other boundary spanners from multiple companies in the network. Because a whole range of boundary spanners were involved in solutions provision, solely focusing on traditional boundary spanning functions (e.g., purchasing and sales managers) would have been misguided.

6.3. Managerial Implications

The identified boundary spanning functions can be classed as managerial capabilities that facilitate and sustain inter-organisational relationships and have clear practical implications. First, as manufacturers servitize, managers interact with more companies in the network, meaning that they span more organisational boundaries. The range of interactions indicates that these managers need to have a greater awareness of different contexts rather than being specialised in one. Second, in addition to the broader expertise that is required, boundary spanners in servitization perform a wider range of boundary spanning functions, roles and practices. Managers need to be excellent communicators, negotiators and trainers who can provide innovative solutions for the customer. This indicates that recruitment and training within manufacturers should

identify and develop these skills. Third, boundary spanners act as bridges between the different organisations and, as such, their potential failure poses a risk to the manufacturer and its network. Servitizing firms should diversify these activities to focus on the boundary spanning *role* rather than the *boundary spanner* (i.e., the individual). This could be done by using multiple managers as boundary spanners or institutionalising boundary spanning by, for instance, creating new departments (such as the creation of the telematics department at AlphaCo with co-located employees of TechCo).

6.4. Research Limitations and Further Research

An overarching constraint of this study was that the scope of research was limited to the servitized network of a single manufacturer. However, this was a large-scale network study of 11 firms and multiple inter-organisational relationships, focused on developing an in-depth narrative of boundary spanners in servitization. Thus, it contributes to the theory of the phenomenon, resulting in analytical generalisation (Yin, 2009) rather than statistical generalisation. Analytical generalisation does not pertain to some defined population that has been sampled, but rather, it relates to a theory of the phenomenon being studied, a theory that may have much wider applicability than the case studied (Yin, 2009). Nevertheless, this is a single-case network study; therefore, it is context-specific. Future research could examine the way in which the boundary spanning functions, roles and practices identified in this study can be enacted in other industrial networks. An extension of this would be to investigate the relationships among the five boundary spanning functions in a network over a prolonged period.

Another limitation relates to the focus on inter-organisational boundary spanners. The case clearly shows the importance of intra-organisational boundary spanning, such as leadership involvement in driving the servitization agenda within the organisation. Intra-organisational boundary spanning is an additional avenue for research. For instance, future research could investigate the relationship between intra- and inter-organisational boundary spanners. To what extent is the separation of intra- and inter-organisational boundary spanning necessary or efficient? What is the nature of the relationship between boundary spanning and non-boundary spanning roles and activities in servitization? An example could be the relationship between product development or

technology departments, with after-sales or maintenance teams. Hence, further research focusing on managerial-level enquiry within servitization contexts is encouraged.

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Table 1. Conceptual framework derived from prior literature

Functions	Roles	Practices	Adoption		References
			Product	Solution	
Communication	- External Representative - Leader	Routine practices	X	X	Aldrich and Herker, 1977; Lian and Laing, 2007; Perrone *et al.*, 2003; Roehrich and Lewis, 2014; Storbacka, 2011; Stock, 2006; Zhang *et al.*, 2011
		Relational practices		X	
		Co-ordinating practices (e.g. exchanging future plans)		X	
Ability to compromise	Negotiator	Negotiating contracts	X	X	Bensaou, 1999; Johnstone *et al.*, 2009; Baines *et al.*, 2013; Raddats *et al.*, 2017; Nanonen and Storbacka, 2013; Williams, 2002
		Problem solving		X	
Professional knowledge	Trainer	Training practices		X	Bensaou, 1999; Johnstone *et al.*, 2009; Baines and Lightfoot, 2013; Raddats *et al.*, 2017; Nanonen and Storbacka, 2013; Williams, 2002

Table 2. Interviewee details

Supply Chain Role	Organisation	No. of Interviews	Interviewed job titles	Network Mode: product- or solution-provision network?
Manufacturer	AlphaCo (HQ)	29	Board-level management (e.g. CEO, heads of departments) Senior management (e.g. sales and after-sales directors) Operational-level (Sales and service delivery managers)	Product- and solution-provision networks
	AlphaCo (Regional)	5	General manager, service operations manager, service marketing and business development manager, parts manager	Product- and solution-provision networks
Suppliers	Dealer 1	1	Customer services manager	Product- and solution-provision networks
	Dealer 2	7	General manager, service operations manager, service marketing and business development manager, parts manager	Product- and solution-provision networks
	Dealer 3	2	Managing director, service manager	Product- and solution-provision networks
	Dealer 4	4	Managing director, service operations managers, parts manager, service technician	Product- and solution-provision networks
	Dealer 5	4	Director, service operations manager, parts	Product- and solution-provision networks
Strategic Partner	TechCo	3	CEO, business development manager, software development engineers	Solution-provision network
Customers	Customer 1– Large Multinational	2	CEO, service manager	Product- and solution-provision networks
	Customer 2 – Large National	2	Fleet engineer, finance director	Product- and solution-provision networks
	Customer 3 – Small Fleet Owner	1	Business owner/ driver	Product-provision network
	Customer 4 – Owner Driver	1	Business owner/ driver	Product-provision network
	Total	**61 interviews**		

Table 3. Identified boundary spanning functions, roles, and practices in solutions provision compared to the conceptual framework (i.e. initial)

Functions		Roles		Practices	
Initial	**Identified**	**Initial**	**Identified**	**Initial**	**Identified**
Communication	***Strategic Communication***	External Representative	***External Representative***	Routine tasks	***Sales and representations***
					Shows and conventions
				Relational tasks	**Involving customers as representative**
					Involving technology partner to champion services
		Leader	***Leader***	Co-ordinating tasks (e.g. exchanging future plans)	**CEOs pushing the agenda**
					Dealer directors being involved
					Partner firms' CEOs acting as advocates
Ability to Compromise	**Dissonance Reduction**	Negotiator	**Relationship Facilitator**	Negotiate contracts	***Negotiate contracts***
				Problem solving	**Acting as middle-man within the dealer customer disputes**
					Becoming a 'shock absorber' to reduce tensions by offering incentives and introducing penalties
Professional Knowledge	***Professional Education***	Trainer	***Trainer***	Training tasks	***Maintenance service training for dealers***
					Telematics training for customers
					Telematics training for dealers
					System and software training for manufacturers
	Consultation		**Business / Technical Advisor**		**Sales executives becoming transport consultants**
					After-sales business managers intervening when a dealer fails to meet service standards
					Regional service engineer
	Leverage offerings		**Innovator**		**Creations of environmental reports**
					Creation of driver behaviour reports resulting in customised training

Key: In the columns titled 'Identified", text in **bold** indicates the new themes and text in ***bold italics*** indicates themes that were expanded/modified in light of the empirical analysis with respect to the conceptual framework (i.e. initial).

Table 4. Definitions of identified boundary spanning functions in relation to conceptual framework (i.e. initial)

Initial		Identified	
Functions	**Descriptor**	**Functions**	**Descriptor**
Communication	The ability to communicate information from the core of an organisation towards the environment	***Strategic Communication***	***The ability to effectively present a firm's strategic intention and offerings***
Ability to compromise	The ability to effectively overcome challenges and disputes between the firm and the network	**Dissonance Reduction**	**The ability to reduce cognitive dissonance among actors by shaping the middle ground between boundary spanners.**
Professional knowledge	The ability to use knowledge and expertise to influence employee behaviour	***Professional Education***	***The ability to provide required education and training***
		Consultation	**The ability to provide business and technical expertise**
		Leverage Offerings	**The ability to leverage offerings to meet customers' evolving needs**

Table 5. Definitions of identified boundary spanning roles in relation to conceptual framework (i.e. initial)

Initial		Identified	
Roles	**Descriptor**	**Roles**	**Descriptor**
External representative	To represent the organisation in external facing mediums	***External representative***	***To represent the organisation in external facing mediums***
Leader	To lead as the internal champion within the firm	***Leader***	***To drive the agenda and motivate the internal and external stakeholders underpinned by informal and ad hoc relational exchange***
Negotiator	To negotiate contract and product specifications	**Relationship Facilitator**	**To act as a bridge or barrier in order to settle disputes and negotiate discrepancies within the network underpinned by trust and relational mechanisms**
Trainer	To provide training for product and pricing features mainly for internal employees	***Trainer***	***To educate internal and external stakeholders supported by formal training processes and programmes specific to solutions***
		Business / Technical Advisor	**To provide business and technical expertise to aid the network**
		Innovator	**To innovate new services and technology to help a customer's business**

Key: In the columns titled 'Identified", text in **bold** indicates the new themes and text in ***bold italics*** indicate themes that were expanded/modified in light of the empirical analysis with respect to the conceptual framework (i.e. initial).

Appendix A. Part of the coding structure for the boundary spanning function that was termed consultation